Aalto University
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The Effect of Internal Control Deficiencies on Audit Fees and Audit Report Lags

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Abstract

An audit can be viewed as a part of an entity's overall financial reporting system, and as such an audit has its substitutes and complements. As the benefits of a well-functioning financial reporting system, of which both internal controls and auditing are a part of, are in liability avoidance, it follows that internal control is a substitute for auditing, and vice versa. Therefore, a weakness in internal control affects the amount of audit work, which is reflected both in the price of an audit and the length of an audit.

The Sarbanes-Oxley Act, implemented in the aftermath of several accounting fraud scandals, aims to enhance financial disclosures and prevent fraudulent accounting. Internal control reporting requirements in Section 404 have been arguably one of the most controversial aspects of SOX as they require the management to document, evaluate, and publicly report the effectiveness of internal controls and the auditor to attest to and report on this assessment. Section 404 internal control disclosures provide more insight into the internal controls of an entity, and open up a new way to research the effects that internal control has on auditing.

This thesis investigates how a reported material weakness in internal control influences audit fees and audit report lag. As a weakness in internal control will likely lead to more audit work, the assumption is that a material weakness in internal control affecting financial reporting will increase the price of an audit and prolong the audit report lag. The first hypothesis is that audit fees will be higher for companies that have reported one or more internal control deficiencies under SOX Section 404. The second hypothesis is that the audit report lag will be longer for companies that have reported one or more internal control deficiencies under SOX Section 404.

The hypotheses are evaluated using multivariate regression analysis. The analyses will be carried out to model the relationships that audit fees and audit report lags have to their determinants. The data used is taken from Compustat and AuditAnalytics databases and consists of financial information of U.S. companies with fiscal year end dates between 01/01/2005 and 31/12/2015.

The results are that a reported material weakness in internal control has a significant positive relationship with audit fees and audit report lags. The percentage effect of an internal control deficiency on audit fees is 20.2 % and 9.4 % on audit report lag. These findings are consistent with previous research, and add to the body of knowledge concerning the effects of reported internal control deficiencies.

Keywords internal control deficiency, audit fee, audit report lag, Sarbanes-Oxley Act, Section 404

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Tiivistelmä

Tilintarkastusta voidaan pitää osana talousraportointijärjestelmää ja sen vuoksi tilintarkastuksella on korvikkeensa ja komplementtinsa. Koska hyvin toimivan talousraportointijärjestelmän, jonka osia sekä sisäinen kontrolliympäristö sekä tilintarkastus ovat, hyödyt ovat vastuuseen joutumisen välttämisessä, seuraa että sisäinen tarkastus on korvike tilintarkastukselle, ja päinvastoin. Tämän vuoksi sisäinen kontrollipuute vaikuttaa tilintarkastustyön määrään, mikä vaikuttaa sekä tilintarkastuksen hintaan että kestoon.

Sarbanes-Oxley laki, joka säädettiin useiden kirjanpitopetosskandaalien seurauksena, pyrkii parantamaan tilinpäätöstietoja ja ehkäisemään vääristeltyä kirjanpitoa. Sisäisen valvonnan raportointivastuut 404-pykälässä ovat olleet SOX:n kiistanalaisimpia velvoitteita, sillä ne edellyttävät johtoa dokumentoimaan, arvioimaan ja julkisesti raportoimaan sisäisten kontrollien toimivuudesta ja tilintarkastajaa lausumaan johdon arvion paikkansapitävyydestä. 404-pykälän edellyttämä raportointi sisäisten kontrollien toimivuudesta antaa enemmän tietoa yhteisön sisäisistä kontrolleista ja samalla mahdollistaa uuden tavan tutkia sisäisen kontrollin vaikutuksia tilintarkastukseen.

Tämä Pro Gradu –tutkielma käsittelee miten raportoitu sisäinen kontrollipuute vaikuttaa tilintarkastuspalkkioihin ja tilintarkastuksen kestoon. Sisäinen kontrollipuute todennäköisesti lisää tilintarkastustyön määrää ja oletuksena on että raportoitu sisäinen kontrollipuutee nostaa tilintarkastuksen hintaa ja pidentää sen kestoa. Ensimmäinen hypoteesi on että tilintarkastuspalkkiot ovat suurempia yhteisöille, jotka ovat raportoineet vähintään yhden sisäisen kontrollipuutteen SOX 404-pykälän mukaisesti. Toinen hypoteesi on että tilintarkastusviive on pidempi yhteisöille jotka ovat raportoineet vähintään yhden sisäisen kontrollipuutteen SOX 404-pykälän mukaisesti.

Hypoteesit pyritään todentamaan käyttämällä monimuuttujaregressioanalyysia. Analyysit tehdään jotta saataisiin mallinnettua tilintarkastuspalkkioiden ja tilintarkastusviiveen suhdetta niiden tekijöihin. Käytettävä data on haettu Compustat ja AuditAnalytics –järjestelmistä ja koostuu yhdysvaltalaisyritysten taloudellisesta informaatiosta tilikausilta, jotka päättyivät välillä 1.1.2005-31.12.2015.

Tutkimustuloksena on että sisäisellä kontrollipuutteella on tilastollisesti merkittävä positiivinen vaikutus tilintarkastuspalkkioihin ja tilintarkastusviiveeseen. Sisäisen kontrollipuutteen prosenttivaikutus tilintarkastuspalkkioihin on 20.2 % ja tilintarkastusviiveeseen 9.4 %. Nämä tutkimustulokset ovat linjassa aiemman tutkimuksen kanssa, ja lisäävät tietoa sisäisten kontrollipuutteiden vaikutuksista.

Avainsanat sisäinen kontrollipuute, tilintarkastuspalkkio, tilintarkastusviive, Sarbanes-Oxley

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1 Introduction

1.1 Background

Auditing has risen from the need of objective evaluation of information presented in a financial statement of an entity. This need arises from information asymmetry and conflicts of interest between those producing the financial statements and those using the financial statements. The former is the entity's management, who are responsible for managing the entity's assets, while the latter are the entity's owners, who have invested in the company and are thus interested in its financial performance. The management generally has more information regarding the entity's financial position than the owners, especially when ownership is spread out and the owners are not actively involved in the management of the entity. There is thus an asymmetry of information.

The management's goals may not always coincide with those of the owners, which creates a conflict of interest. This conflict can be somewhat mediated by management reporting to the owners, for example, by presenting them with financial statements. Due to the information asymmetry, the owners cannot themselves verify the accuracy of the financial reports. The reports are also somewhat influenced by management's assertions, which the management cannot evaluate objectively. To resolve the issues of information asymmetry and conflicts of interest, the management can employ an independent auditor, who reports on the fairness of the financial statements. The auditor gathers evidence to evaluate the financial statements and reports on whether they give a true and fair view of the entity's financial situation. An unmodified opinion, or a 'clear report', adds to the credibility of the financial statements, and thus reduces the information risk of the owners. (Eilifsen et al 2014: 5–7)

The Sarbanes-Oxley Act, implemented in the aftermath of several accounting fraud scandals, aims to enhance financial disclosures and prevent fraudulent accounting. SOX marked an unprecedented shift from self-regulation to government-regulation in the history of regulatory intervention in US audit markets and has been a focal point in auditing research. Internal control reporting requirements in Section 404

have been arguably one of the most controversial aspects of SOX. (DeFond and Zhang 2014) Many have asserted that SOX Section 404 imposes an extreme burden on entities as it requires them to not only document, evaluate, and publicly report the effectiveness of internal controls but also to have the auditor attest to and report on this assessment (Ashbaugh-Skaife, Collins, and Kinney 2007: 189). Section 404 internal control disclosures provide more insight into the internal controls of an entity, and open up a new way to research the effects of internal control on auditing.

1.2 Hypotheses and Research Design

According to Simunic, an external audit can be viewed as a part of an entity's overall financial reporting system. From this view point, an audit is an economic good, which has its substitutes and complements. As the benefits of a well-functioning financial reporting system, of which both internal controls and auditing are a part of, are in liability avoidance, it follows that internal control is a substitute for auditing, and vice versa. (Simunic 1980: 162) If internal control is a substitute for auditing, a weakness in internal control would affect the amount of audit work, which would be reflected both in the price of an audit and the length of an audit.

First, we will investigate how a reported internal control deficiency influences audit fees. As a weakness in internal control will likely lead to more audit work, the assumption is that the presence of an internal control deficiency will increase the price of an audit. The assumption is supported by prior research by Raghunandan and Rama (Raghunandan and Rama 2006).

Hypothesis 1: Audit fees will be higher for companies that have reported one or more internal control deficiencies under SOX Section 404.

Second, we will determine the relationship between a reported internal control deficiency and audit report lag, which is the number of days between fiscal year end and the date of the audit report. As an internal control deficiency should increase

the amount of audit work, it should also increase audit report lag. Munsif, Raghunandan, and Rama found evidence of a positive relationship between reported internal control deficiencies and audit report lags (Munsif, Raghunandan, and Rama 2012).

Hypothesis 2: Audit report lag will be longer for companies that have reported one or more internal control deficiencies under SOX Section 404.

The hypotheses will be evaluated using multivariate regression analysis. The analyses will be carried out to model the relationships that audit fees and audit report lags have to their determinants. The data used is taken from Compustat and AuditAnalytics databases and consists of financial information of U.S. companies with fiscal year end dates between 01/01/2005 and 31/12/2015. Prior research has not included as long a time period or as many observations. Raghunandan and Rama's research, for example, focused on the first years after the implementation of SOX Section 404. As time passes from the implementation of SOX Section 404, more data on internal control deficiencies becomes available, allowing the inclusion of a larger number of observations to the data to be studied.

1.3 Structure of the Thesis

The introduction presented in section 1 is followed by a literature review broken down into three sections: section 2 presents the concept of internal control and internal control deficiencies, section 3 cover the determinants of audit fees found in prior research, and section 4 discusses the determinants of audit report lags found in prior research. The literature review is followed by data and methods in section 5, which goes over the data selection process and descriptive statistics of the data. Section 6 consists of model diagnostics of the regression analyses and the results of the analyses, while section 7 includes the evaluation of the results in light of previous research. The last section of the thesis, section 8, is conclusions.

2 Internal Control and Internal Control Deficiencies

2.1 Components of Internal Control

An entity's management is responsible for designing and implementing a system of internal controls that ensures financial and non-financial reporting is reliable and timely, operations are effective and efficient, and applicable laws and regulations are followed. According to the COSO framework, internal control can be further broken down into five components: control environment, entity's risk assessment, control activities, information and communication, and monitoring activities. The control environment is the set of rules, guidelines, and organisational structures that form the foundation for internal control in an organisation. This environment sets the tone of internal control in an entity. The entity's risk assessment process covers the identification and assessment of risks to the entity's objectives as well as the identification and assessment of risk-reducing changes. Control activities mitigate risks to the achievement of the entity's goals and are performed on all organisational levels. Control activities include approvals, authorisations, verifications, reconciliations, and segregation of duties. Information and communication are needed so that everyone within the entity is aware of internal control responsibilities and understands the importance of those controls. Monitoring activities are ongoing or separate evaluations of controls to determine whether they are operating effectively. Together these five components represent what the entity needs to do in order to achieve the three objectives of internal control: operations, reporting, and compliance. An auditor is mainly concerned with how internal control affects the external financial reporting. (Eilifsen et al, 2014)

2.2 Internal Control and Auditing

The auditor is required to obtain an understanding of an entity's internal control, covering all five components listed above. The auditor might, for example, interview the entity's management to get a sense of the control environment of the company. If the entity makes extensive use of IT systems, the auditor needs to understand the controls that are relevant for the financial reporting process. The auditor then uses this understanding to identify what kinds of misstatements may occur, factors that

contribute to the risk of a material misstatement, and design substantive tests and tests of controls. In testing the control, the auditor may detect a deficiency in internal control. The Public Company Accounting Oversight Board defines it as follows: “A **deficiency** in internal control over financial reporting exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent or detect misstatements on a timely basis.”[1] An internal control deficiency may result from a control that is designed, implemented or operated in a way that renders the control ineffective. It may also result from missing a necessary control altogether. (Eilifsen et al, 2014)

2.3 Sarbanes-Oxley Act and Internal Control Audits

The Sarbanes-Oxley Act was signed into law in July 2002 in the aftermath of accounting scandals such as Enron and WorldCom. The Act mandated numerous reforms to enhance corporate responsibility and financial disclosures as well as combat corporate and accounting fraud, and created the "Public Company Accounting Oversight Board" (SEC 2013). Since its implementation, SOX has been a focal point in auditing research. Some major SOX provisions are the requirement of financial expertise on audit committees, Section 404 audits, restrictions on employing former auditors, and mandated PCAOB inspections. Arguably the costliest and most controversial SOX provision is Section 404. (DeFond and Zhang 2014) It has been estimated that the average SOX implementation costs per client were $ 2 million (Krishnan et al. 2008).

Section 404 of the Sarbanes-Oxley Act requires that annual reports filed with the Securities and Exchange Commission in the United States shall “contain an internal control report, which shall:

1) state the responsibility of management for establishing and maintaining an adequate internal control structure and procedures for financial reporting; and

[1] https://pcaobus.org/Standards/Auditing/Pages/Auditing_Standard_5_Appendix_A.aspx

2) contain an assessment, as of the end of the most recent fiscal year of the issuer, of the effectiveness of the internal control structure and procedures of the issuer for financial reporting."

In addition, section 404 states that "[W]ith respect to the internal control assessment required by subsection (a), each registered public accounting firm that prepares or issues the audit report for the issuer shall attest to, and report on, the assessment made by the management of the issuer ... Any such attestation shall not be the subject of a separate engagement." Section 404 thus requires that both management and the auditor to report on the effectiveness of internal control of the entity. (Raghunandan and Rama 2006: 100-101)

As mentioned earlier, there are high costs associated with implementing section 404, and a substantial part of these costs are audit fees. Previously, in the pre-SOX era, auditors could choose not to rely on internal controls and only conduct substantive testing. However, SOX Section 404 requires the auditor to not only evaluate management's statement on the effectiveness of internal control but also to conduct an independent assessment of internal controls. This change means that in following the implementation of Section 404 auditors are always required to test internal controls, which increases the amount of effort required by the audits of internal control. Additional work is required if a material weakness in internal control is detected, as then the auditor will need to carry out additional testing, discuss the matter with the entity's management, and document the reasoning why a material weakness was classified as such, as opposed to a significant deficiency, which does not need to be reported in the SEC filings. (Raghunandan and Rama 2006: 101-102)

2.4 Determinants of Material Weaknesses in Financial Reporting

Prior to SOX-mandated internal control audits, required under Section 404, internal control deficiencies could be reported under Section 302. Section 302 required management to evaluate internal controls and procedures, report on this evaluation, and report any internal control deficiency identified, if management concludes the deficiency should be publicly disclosed. As opposed to Section 404, Section 302 allows for more managerial discretion. In a study on internal control disclosures under Section 302 prior to the implementation of Section 404, Ashbaugh-Skaife, Collins,

and Kinney find that entities reporting internal control deficiencies have more complex operations, recent organisational changes, higher auditor turnover, and less resources dedicated to internal control. Additionally, the study found that smaller, financially distressed firms are more likely to disclose internal control deficiencies, and that an auditor resignation in the year prior to the internal control deficiency disclosure is a highly significant risk factor in explaining the occurrence of internal control deficiencies. The entities disclosing internal control deficiencies under Section 302 are more likely audited by a dominant auditor and are more likely to issue financial restatements. (Ashbaugh-Skaife, Collins, and Kinney 2007: 166-168, 190)

In their 2007 study on determinants of internal control weaknesses over financial reporting, Doyle, Ge, and McVay find that the determinants of disclosed material weaknesses vary based on the reason for the material weakness and the pervasiveness of the material weakness. Three different categories based on the reason behind a material weakness disclosure are formed: staffing, complexity, and general. In comparison to complexity and general weaknesses, staffing issues are more pervasive smaller, younger, and financially weaker entities, which most often have the least complex organisational structures. In addition, these entities tend to have higher sales growth. These findings imply that the younger, growing firms may struggle to commit the sufficient resources required to maintain strong internal controls. Entities with complexity weaknesses, on the other hand, tend to be the largest, oldest, and most operationally diverse as well as have the highest governance quality. Lastly, general material weaknesses are reported by a diverse group of entities, as general weaknesses cover a large range of internal control issues, ranging from lacking documentation to problems with revenue recognition. Compared to the other two categories, this category includes more issues that are related to earnings management, and interestingly it appears that the control deficiencies detected might be associated with poor governance. (Doyle, Ge, and McVay 2007: 197, 214)

With regard to their severity, material weaknesses can be divided into account-specific and company-level material weaknesses. An account-specific material weakness only affects the account balance in question, and this type of weakness could possibly be identified by the auditor and through more substantive audit procedures sufficient audit evidence could still be obtained from that account, thus posing no

serious concern for the overall reliability of the entity's financial statements. Entities reporting account-specific weaknesses tend to be larger, older, and financially stronger and also have more complex operations and more growth. It seems logical that severe, account-specific issues are more common in mature entities that are more likely to face complex accounting issues than smaller and less complex entities. (Doyle, Ge, and McVay 2007: 205-206, 214)

A company-level material weakness is more invasive and caused by a failing in a macro-level control, like the control environment the entire process of financial reporting. Such a pervasive internal control deficiency could pose severe issues for conducting the audit and obtaining sufficient audit evidence, and could lead to questioning the entity's ability to prepare reliable financial statements. Entities with company-level weaknesses are found to be younger, smaller, and financially weaker as well as less complex. Overall, entities with severe internal control issues appear to lack the resources or proficiency to manage a strong internal control system. (Doyle, Ge, and McVay 2007: 205-206, 213-214)

In general, the study found that a material weakness in internal control is more likely for entities that are smaller, younger, less profitable, more complex, growing rapidly, or undergoing restructuring (Doyle, Ge, and McVay 2007: 220). These results are similar to those obtained from the study of Ashbaugh-Skaife et al., with the latter also finding that auditor resignations could be indicative of internal control deficiencies. Both studies found a link between complexity of operations and internal control deficiencies, which is logical, as the more complex an entity becomes the higher the demands for internal control become; as complexity increases, operations often become more spread out, which puts a strain on internal control. Restructuring of operations, which may come about due to mergers and acquisitions, requires changes to internal controls, and in if these changes are not implemented with due care, internal control deficiencies may be created. Growing entities face a similar threat to internal control, as internal controls may not keep up with the expanding operations, and smaller or financially distressed entities may simply lack the resources to dedicate due care for maintaining a functioning internal control system.

3 Determinants of Audit Fees

3.1 Overview of Audit Pricing Theory

Audit fees and their determinants have been widely researched all over the world. As reporting audit fees in the financial statements is becoming increasingly popular, the availability of data is increasing, opening further opportunities for audit pricing research. One of the founding fathers of audit pricing research is Simunic, who in 1980 researched the determinants of audit fees. He hypothesized that size, complexity of operations, financial statement components that are difficult to audit, industry, and form of ownership of the auditee would affect the auditor's exposure to loss, which would in turn affect the audit fee. In his audit-pricing model, Simunic also included profitability, loss, reception of a qualified opinion, and the length of time the current auditor has been auditing the auditee, while form of ownership was not included in the model. Simunic found a statistically significant relationship between audit fees all the determinants he identified except for profitability. (Simunic 1980: 172, 176, 186-187)

While later research has used identified several other determinants of audit fees, the determinants Simunic found in his research are still at the core of audit fee research. However, some of the determinants have been found to have a different impact on audit fees across countries (Nikkinen & Sahlström 2004: 261). The effects that determinants have on audit fees can also differ from one study to another within the same geographical area, but for many independent variables the results are consistent when looking at a greater number of studies (Hay et al. 2006: 141). The rest of this section outlines the determinants of audit fees used in audit fee research, and examines their relationship to audit fees.

3.2 Size

According to Hay, Knechel, and Wong's 2006 meta-analysis study, the size of the auditee is the most dominant determinant of audit fees, found in virtually all published studies they examined. Their meta-analysis points to a positive association between size of an entity and audit fees, and the analysis also suggests that size is

a critical explanatory variable for a model of audit fees. The size of the auditee is most commonly measured by its total assets and occasionally by its revenue.

There are some issues in regard to using revenue as a determinant of audit fees: firstly, the definition of turnover may vary from industry to industry and secondly, larger sales volume does not necessarily increase the amount of audit work (Chan, Ezzamel, and Gwilliam 1993: 766). Simunic remarks that external auditors have traditionally approached the audit from the balance sheet, relying on the assumption that if the balance sheet is verified, its components will indirectly verify the income statement. He also notes that auditing is a sampling-based process, and the greater the total assets the elements that it consists of become more numerous, resulting in larger sample sizes and thus more work. (Simunic 1980: 172)

Even though size is quite clearly an important determinant of audit fees, there has been some criticism towards the assumption of a linear relationship between size of the auditee and audit fees. Typical fee models, which do not account for a non-linear relationship between size and fees, may influence tests of determinants of audit fees. (Carson, Fargher, Simon, and Taylor 2004: 89)

3.3 Complexity

When an entity is more diverse and decentralised, the number of decision centres increases, and more monitoring of these decision centres is needed. (Simunic, 1980: 172) Therefore, the more complex a client is, the harder it is to audit. In prior research, complexity has been measured in several different ways, the most typical being the number of subsidiaries, the number of foreign subsidiaries, and the proportion of foreign assets. While the measures for complexity have been varied, previous empirical evidence shows strong support to a positive correlation between complexity and audit fees. (Hay et al 2006: 169)

Audits of parent companies could be presumed to be more complex, and thus laborious, than audits of non-parents, as auditors of parent companies are usually required to audit not only the parent company's financial statements but the group's

consolidated financial statements as well. Conducting audits of several group companies, as opposed to one audit for a company the size of all group companies combined, increases statutory reporting requirements, which in turn may lower the levels of materiality for subsidiaries below the materiality thresholds established at the group level. Lower levels of materiality tend to result in more audit work. A group auditor also needs to audit intragroup transactions, if such transactions have taken place during the fiscal year being audited. (Chan et al. 1993: 767)

Audits of foreign subsidiaries should be costlier than audits of similar domestic companies, as the complexity of financial reporting is greater for them. Differing accounting rules between countries result in the subsidiary producing at least two sets of financial statements – one set that complies with regulations in the country in which it is operating, and another set that follows the accounting rules and regulations of the parent company and can be used for consolidation of group financial statements. Often foreign subsidiaries operate in a different currency from the parent company's operational currency, making foreign currency translations necessary. (Niemi 2005: 308-309, 311)

3.4 Audit Risk

Most auditors plan their audit approach using an audit risk model, where the perceived audit risk is used to determine the extent and scope of audit testing. Audit risk is the risk that the auditor gives an unmodified opinion when the financial statements contain a material misstatement. Audit risk can be broken down into three different factors:

$$Audit\ Risk = Inherent\ Risk\ \times Control\ Risk\ \times Detection\ Risk$$

Inherent risk and control risk can be combined as the risk of material misstatement, where inherent risk is the part of the risk that does not result from an internal control deficiency. The risk of material misstatement depends on the client, and the auditor has little control over it. Detection risk is the risk that the audit procedures fail to detect a misstatement, which could individually or combined to other misstatements result in a material misstatement. The auditor influences audit risk by setting the

level of detection risk. Therefore, if the risk of material misstatement is high, the auditor will plan to conduct more audit testing to reduce the detection risk and thus reduce the overall audit risk. Interviews conducted with representatives of the leading audit firms in 1993 confirmed that audit risk is a significant factor in planning the amount of audit work to be completed and by consequence the audit fee charged. (Eilifsen et al 2014: 96; Chan et al. 1993: 769)

Audit risk is difficult to measure directly, making it difficult to study its effect on audit fees. Inherent risk may increase audit fees, as it may require specialised audit procedures. Two areas that are often attributed as difficult to audit are inventory and receivables. Most often inherent risk is measured by inventory as a portion of total assets, receivables as a portion of total assets, or the combination of inventory and receivables as a portion of total assets. (Chan et al. 1993: 769; Hay et al 2006: 170, Simunic 1980: 173)

3.5 Profitability and Leverage

If an entity has poor profitability, it is more likely that the auditor will be exposed to a loss. In most previous studies, a ratio of net income divided by total assets and/or a dummy variable for loss is used to measure profitability. The expected relationships between return on assets (ROA) and a loss with audit fees are negative and positive, respectively. Previous studies show a mixed result for the profitability ratio, but there is a significant negative overall result. Some previous research has found the dummy variable of loss to have a significant and positive effect on audit fees. The mixed results suggest that auditors may not put as much emphasis on differences in these metrics when pricing the audit as the model suggests. (Hay et al 2006: 170-171)

Leverage is another measure of potential exposure to risk of loss for the auditor (Simunic 1980). The expected relationship between audit fees and leverage, measured with the ratio to debt to total assets, is positive – the more debt there is, the higher the audit fees are expected to be. This is because a highly indebted entity has a greater risk of bankruptcy. The quick ratio, which is the ratio of current assets to less inventories to current liabilities and thus measures the entity's short-term

liquidity, is also used in several studies, and it has a negative relationship with audit fees. (Hay et al 2006: 171; Nikkinen & Sahlström 2004: 255)

3.6 Form of Ownership

According to the agency theory, there is information asymmetry and conflicts of interest between the management and owners of an entity. Resolving this asymmetry and conflicts of interest result in agency costs, for example the price of an audit conducted by an independent auditor. If an entity is both managed and owned by the same individuals, the asymmetry of information is reduced and interests coincide to a greater extent, leading to fewer conflicts of interest. Nikkinen and Sahlström have proposed that there should be a negative relationship between audit fees and management ownership, as an entity with more management ownership should have lower agency costs, as per the agency theory. In their 2004 study spanning seven countries that represented different kinds of accounting environments, Nikkinen and Sahlström found evidence for the existence of the negative relationship, concluding that the amount of management ownership affects the audit fees. (Nikkinen & Sahlström 2004: 255, 261)

Another way of looking at the relationship between ownership and audit fees is to consider the ownership structure. It has been hypothesized in a 1993 study by Chan et al. that far spread ownership creates a need for a more extensive and high-quality audit than an audit fulfilling the statutory requirements. This hypothesis is based on the idea of ownership control: major shareholders are assumed to be able to monitor the entity and control management directly or indirectly, reducing the need for additional audit work exceeding the requirements of a statutory audit, and consequently, lowering audit fees. The study found that ownership control was an important determinant of audit fees. (Chan et al. 1993: 770, 780)

3.7 Free Cash Flow

In prior research, it has been proposed that the higher free cash flow an entity has, the more severe its agency problem becomes. The more cash reserves an entity

has, the more choices the management has on how to use the funds, and this increases the need of supervision of management behaviour. This oversight can be gained from an audit, and following this line of thought, Nikkinen and Sahlström bring forward the hypothesis that there is a positive relationship between free cash flow and audit fees. Regular debt payments may also help in keeping consumption of funds in check, and thus debt may in fact reduce agency costs. However, debt payments also decrease free cash flow. Nikkinen and Sahlström conclude that a positive relationship between free cash flow and audit fees is found in all of the seven countries studied in their research paper. (Nikkinen & Sahlström 2004: 255)

3.8 Location

Chan et al. investigated the relationship between geographic location and audit fees in the United Kingdom. They used a dummy variable to look at whether audit fees were higher in the London area in comparison to the rest of the UK and found that there was clear evidence for the presence of a London premium in audit fees. The presence of a London premium was also found to be statistically significant in a later study by Che-Ahmad and Houghton. The effect of several locations requiring on-site visits has also been investigated, and was found to be statistically significant in a 1986 study, however, it can be argued that the number of locations requiring on-site visits to conduct an audit is associated with auditee complexity. (Chan et al. 1993: 770-771, 780-781; Palmrose 1986: 100; Che-Ahmad & Houghton 1996)

3.9 Fiscal Year End Date

In many countries, the most popular fiscal year end date is December 31st and due to this the demand for audit services is higher at the beginning of the year during the auditors' busy season. In their study of quoted UK companies, Chan et al. measured the effect of fiscal year end date on audit fees. For their analysis, they divided their observations into groups based on the fiscal year end dates: fiscal years ending between December 1st and March 31st were considered to fall on the busy season. The study did not find the dummy variable for busy season to be statistically significant. (Chan et al. 1993: 770, 773) In another study by Che-Ahmad and Houghton,

it was similarly hypothesized that during the busy season when the auditors' workload is higher, due to the higher demand or possibly higher costs, higher prices might be charged. The study also did not find a statistically significant link between fiscal year end coinciding with the busy season and higher audit fees. The lack of a statistically significant relationship between a fiscal year ending during the busy season and audit fees is consistent with the growing phenomenon of year-round audits, where some of the audit work is undertaken outside of the busy season. (Che-Ahmad & Houghton 1993)

3.10 Audit Report Lag

Audit report lag, or the time between fiscal year end and the date on which the audit report is issued, can be used as a determinant of audit fees. However, the relationship between the length of the audit report lag and audit fees is not necessarily straight-forward. A long audit report lag can be indicative of audit problems that required more audit work to be resolved, in which case a short audit report lag would suggest less audit work and lower audit fees. But a short audit report lag may also reflect tighter reporting deadlines, which can be met only by employing a larger audit team or having the audit team work overtime, resulting in higher costs for the audit. The latter hypothesis has not been backed up by statistically significant evidence. Looking at larger number of studies, the expected relationship between audit report lag and audit fees is positive, and out of the twelve studies Hay et al. examined in their 2006 study, six showed a statistically significant positive association. (Chan et al. 1993: 770; Hay et al. 2006: 177)

3.11 Auditor Attributes

The audit market is rather concentrated, with the Big 4 (previously Big 5, Big 6, and Big 8) dominating the market especially when looking at the auditors of enlisted public companies. The meta-analysis carried out by Hay et al. found strong support that having a Big 4 (or Big 5, Big 6, Big 8) auditor has a positive relationship with audit fees. Having a Big 4 versus non-Big 4 auditor is sometimes used as a proxy for audit quality, and the higher audit quality of audits carried out by the Big 4 audit firms could in part account for the higher audit fees. In the study by Chan et al., audit

partners interviewed suggested that larger auditees tend to have audit teams with greater expertise, skills, and seniority, and that these qualities could be behind the higher audit fees. They also were of the view that the audit work conducted by such a team would be of higher quality, and that the higher quality would compensate for the increased fees. The same study also detected a Big 8 premium for both large and small auditees. (Hay et al. 2006: 176; Chan et al. 1993: 771, 783)

In a 1981 study, DeAngelo concluded that there was a link between auditor size and perceived audit quality. This link resulted mainly from perceived independence from the client, as a larger auditor would be less likely to behave opportunistically to keep a client, as the client in question would make up a smaller fraction of the auditor's clientele. (DeAngelo 1981: 197) In 2000, DeFond, Francis, and Wong conducted a study on publicly listed companies in Hong Kong and find that there is a Big 6 premium, and divide this premium into general brand name industry specialisation components. (DeFond, Francis, and Wong 2000: 49, 57)

Prior research suggests that a recent change of auditor could have a negative effect on audit fees. This effect is likely due to audit firms offering a discounted rate to win new clients, a phenomenon called low-balling, or the new auditor being more efficient than the previous one. Based on the meta-analysis of Hay et al., a dummy variable indicating an auditor change seems to be the best proxy to use in audit fee models. (Hay et al. 2006: 176)

3.12 Internal Control

Simunic viewed auditing as a part of an entity's financial reporting system, and considered that internal control could be viewed as a substitute to auditing (Simunic 1980: 162). Therefore, the internal control environment of an entity is expected to influence audit fees. Gaining access to internal control data can be challenging, and there is no clear proxy to use for measuring an entity's internal control. Some researchers, who have had access to internal control data, have examined the relationship between internal auditing and audit fees, but the overall meta-result from their results are not statistically significant. (Hay et al. 2006: 175) Internal audit work

may be directly relevant for an external auditor, and in some cases an external auditor may even choose to rely on the work of internal auditors, which would suggest that internal audit expenditure would decrease the amount of work for external auditors and thus affect audit fees. Internal audits are, however, only a part of the internal control function, and only looking at the relationship between internal audits and audit fees does not give the full picture of the relationship between internal control and audit fees. (Eilifsen et al. 2014: 88, 688)

Palmrose used the percentage reduction of audit fees from auditee inputs as an independent variable in the 1986 study. These auditee inputs were defined as increased internal audit activities, improvement of internal controls, and the use of client personnel for some audit tasks. The percentage figure was obtained from a survey given to the auditees, and survey research has its limitations. (Palmrose 1986: 100)

The implementation of SOX Section 404 has made another way of measuring internal control possible, as Section 404 requires entities to disclose material weaknesses in internal control. In a research paper on the effect of SOX Section 404 material weakness disclosures on audit fees from 2006, Raghunandan and Rama found that audit fees were 43 percent higher for clients with a material weakness disclosure pursuant to Section 404 in comparison to clients lacking such disclosure. This suggests that having a material weakness in internal control increases audit fees, which to some extent supports the idea of internal control and auditing being each other's substitutes, as an internal control deficiency leads to higher audit expenditure. (Raghunandan and Rama 2006: 112)

4 Determinants of Audit Report Lag

4.1 Overview of Audit Report Lag

Audit report lag is the length of time auditors need to complete an audit, measured in the number of days between the end of the auditee's fiscal year and the audit report date. Audit report lag can affect the date of accounting disclosures, which is significant, as the information value of the financial statements declines as the audit report lag increases. In fact, the timely confirmation of financial figures is arguably one of the primary benefits of audited financial statements. Unexpected delays in financial reporting have also been linked to lower quality of information, increasing incentives to keep the audit report lag at the relatively the same length from one year to another. Audit report lag may also be used as a measure of audit efficiency, as encountering unexpected problems regarding the audit and not being able to resolve sensitive audit issues in a timely manner can increase the audit report lag. Some determinants of audit report lag may thus provide further insight into audit efficiency. (Bamber, Smith Bamber, and Schoderbek 1993: 1; Knechel and Payne 2001: 137; Hay et al. 2006: 177)

Some determinants of audit report lag are the similar to those of audit fees, as factors that make an audit more time-consuming may affect both the audit fee and the audit report lag.

4.2 Pressure for Prompt Reporting

In addition to the ways in which size affects the amount of audit work, outlined in section 3.2, the size of the auditee can also affect the amount of external pressure to release the financial statement: larger audit clients are likely to face more external pressure to report earnings as soon as possible. Larger clients also tend to have more leverage to persuade their auditors to complete the audit in a timelier manner. If the auditee has favourable earnings news to announce, it is likely that management will attempt to shorten the audit report lag in order to be able to announce the good earnings news as early as possible. In this case the entity's management may

try to speed up the auditing process by negotiating a tighter audit schedule with the auditor. (Bamber et al. 1993: 7)

4.3 Form of Ownership

When ownership of the auditee is spread out, the number of individual investors relying on the auditee's financial statement information is greater, which in turn increases the exposure to litigation and adverse publicity. This increases the business risk of the auditor, which might persuade the auditor to carry out a more extensive audit. However, publicly held companies tend to experience shorter audit report lags than their privately held counterparts. A factor contributing to this outcome is that late financial reporting can result in a negative market reaction, incentivising public companies to keep their audit report lags shorter. The Securities Exchange Commission enforce tighter deadlines for publicly traded companies that have a public float exceeding specified limits, which should decrease the audit report lag. (Bamber et al. 1993: 5; Ashton, Willingham, & Elliott 1987: 287; Munsif, Raghunandan, and Rama 2012: 205)

4.4 Complexity

Complexity affects the amount of required audit work, as the more diverse and complex the auditee is, the higher the chance of a material misstatement becomes, which thus extends the amount of audit work required. Carrying out a more complex audit is more time-consuming, which prolongs the audit report lag. Bamber at al. measured audit complexity by the number of business segments and by the primary industry of an entity. Segment information reported in the financial statements also need to be audited, which increases the amount of audit work. As the entity's operations become more diverse in nature, audit work may also become more strenuous. The primary industry of an entity can also affect audit complexity, as some industries present industry-specific audit challenges, while other industries with lower inventory and fixed assets may be more straight-forward to audit. (Bamber et al. 1993: 5-6)

The presence of extraordinary items on the financial statements can increase the complexity of an audit. Extraordinary items are abnormal, nonrecurring events that are not a product of ordinary business operations. Management's assertions and judgement are involved in the classification of extraordinary items, and these need to be verified. Additionally, a lower materiality threshold should be applied to extraordinary items and thus their inspection requires more audit work. (Bamber et al. 1993: 7)

4.5 Profitability and Leverage

An auditee's weak financial situation increases the risk of loss exposure for the auditor, as discussed in section 3.5. To mitigate this risk, the auditor will carry out more audit work, which may prolong the audit report lag. Besides looking at return on assets and the leverage ratio, net losses can also be used as a determinant of audit report lag. An entity reporting net losses might also suffer from issues such as inventory obsolescence, and therefore more audit work is likely required to obtain a sufficient level of audit evidence. (Bamber et al. 1993: 5, 7)

4.6 Audit Technology

Bamber et al. also looked at the affect audit technology has on audit report lag. They brought forward the hypothesis that a structured audit approach under normal circumstances would lead to a longer audit report lag, but if unexpected events occur with the audit, a structured audit approach decreases the audit report lag. Bamber et al. define a structured audit approach as a standardised audit process which auditors will follow in conducting the audit work, even if it leads to performing audit work or compiling documentation that only serves to fulfil the requirements of the process. However, the additional audit work conducted due to a structured audit approach is hypothesised to expedite the process of dealing with unanticipated occurrences. The study found that audit report lags were indeed on average longer for auditors following a structured audit approach, but that the structured audit approach enabled auditors to respond more quickly to unexpected occurrences, shortening the audit report lag in these situations. These results might suggest that the structured audit approach is more inefficient, or that the structured approach offers

some additional benefits in addition to shortening the audit report lag when unanticipated events take place. (Bamber et al. 1993: 8-9, 19)

However, after the 1993 study by Bamber et al., audit technology has been further developed and the audit technology used today is significantly different from the technology used over two decades ago. Use of advanced audit technology and data analyses has become increasingly important in auditing, and it has been proposed in more recent research that Big 4 auditors' access to advanced audit technology makes them more efficient and may reduce the audit report lag. (Lee and Jahng 2008: 30)

4.7 Auditor's Resources and Resource Allocation

The use of audit report lag as a proxy for audit efficiency or amount of audit work has its limitations: it only measures the audit work conducted after the end of the fiscal year, not taking into account audit work taking place during the fiscal year under audit. Audit report lag also does not take into account the actual work hours of the auditors, as it is measured in days. An audit can be carried out in fewer days by increasing the number of hours dedicated to the audit per day, which can be achieved by increasing the number of audit team members or by having auditors work overtime. However, audit firms are limited by the fixed amount of personnel they employ, which to some extent mitigates the limitation of using days, as opposed to hours, as a measure for the duration of the audit. (Bamber et al. 1993: 19) A study by Knechel and Payne investigated the relationship between incremental audit effort and audit report lag, and found that increase in audit work, measured in hours, prolonged the audit report lag. (Knechel and Payne 2001: 145)

Another aspect of that could influence audit report lag is the resources allocated to an audit engagement. The general assumption is that the more senior the members of the audit team are, the fewer the hours they require to complete the audit. This is based on the partners and managers having more experience, industry-specific knowledge, and an enhanced understanding of the significant risks associated with the audit. Other audit staff presumably tends to rely more on standardised procedures, and has very limited experience in handling unanticipated occurrences. It

follows that all audit hours are not equal, and therefore the effect of rank efficiency needs to be taken under consideration when evaluating the relationship between audit hours worked and audit report lag. Knechel and Payne found that employing more experienced external audit personnel decreased the audit report lag. (Knechel and Payne 2001: 138-139)

The availability of audit personnel has also been found to affect the audit report lag. During the busy season, auditors' resources are stretched thin, and this could potentially lead to longer audit report lags. Knechel and Payne discovered that entities with fiscal year end dates in December experienced longer audit report lags, but previous research on the effect of busy season is inconclusive. (Knechel and Payne 2001: 145)

4.8 Non-Audit Services

Non-audit services can have different effects on audit report lag depending on the type of services being provided. Management advisory services have in previous studies been linked to more efficient audits, as knowledge gained from providing such services increases the auditor's knowledge of the auditee. Conversely, tax services have been found to increase audit report lag, as complicated tax issues can have a direct impact on financial statements and thus tax issues need to be resolved before an audit report can be issued. Knechel and Payne found evidence that provision of management advisory services reduced the audit report lag and tax services increased the audit report lag. (Knechel and Payne 2001: 139, 145)

4.9 Internal Control

Similarly to audit fees, audit report lags are also affected by internal control. In their 2012 study, Munsif, Raghunandan, and Rama found that audit report lags were longer for entities reporting material weaknesses in internal control for years 2008 and 2009. The study also found that entities that had remediated previous internal control deficiencies experienced shorter audit report lags following such remediation, but that the audit report lags were still longer than the audit report lags of entities that had not disclosed material weaknesses at all. This supports Simunic's view

of internal control and auditing being each other's substitutes, as an increase in attention paid to internal control following a material weakness disclosure leads to less resources employed in auditing. (Munsif et al. 2012: 203)

4.10 Other Determinants of Audit Report Lag

Some other determinants of audit report lag used in prior research are auditor tenure, type of audit opinion, and audit fees. The length of auditor tenure may affect audit report lag, as the longer the auditor tenure is, the more familiar the auditor is with the entity and thus the auditor should become more efficient in conducting the audit, and thus auditor tenure should have a negative relationship to audit report lag. (Ashton et al. 1987: 284) An auditor will likely issue a qualified audit opinion only after devoting considerable time and effort into audit procedures in order to avoid issuing a qualified audit opinion, and therefore qualified audit opinions are likely associated with longer audit report lags. It has been the general finding in prior research that entities with qualified audit opinions have longer audit report lags. (Bamber et al. 1993: 7; Ashton et al. 1987: 287)

In section 3.10, audit report lag was presented as a determinant of audit fees, and conversely, audit fees can also be used as a determinant of audit report lag. As both audit fees and audit report lag can be seen as a measurement of the extent of an audit, it logically follows that they would be each other's determinants. A higher audit fee suggests more audit work, which may indicate a longer audit report lag, however, this depends on how the audit work is timed. Interim audit work increases the audit fee, but does not increase the audit report lag, as interim work is carried out prior to the end of the fiscal year. Also, an audit carried out with a larger audit team may increase audit fees, but decrease duration of the audit, and thus the audit report lag. Prior research suggests that audit fee has a negative relationship with audit report lag. (Munsif et al. 2012: 213)

5 Data and Methods

5.1 Data

5.1.1 Data Selection

The data used for this thesis was obtained from Compustat and AuditAnalytics databases and the data was combined using company identifiers and fiscal years. The data consists of financial information of U.S. companies with fiscal years ending between 01/01/2005 and 31/12/2015. SOX Section 404 was implemented in 2003, but additional guidance on its application was issued throughout 2004, and hence these early years of SOX Section 404 are left out of the scope of this study. As all data from the fiscal year 2016 is not yet available, the last year included is 2015.

The data is processed to look for duplicates and missing values for the variables used in the analyses. There are four variables used in either the first and/or the second regression analysis that have missing values, and these are ROA, LEV, INV, and audit report lag. Both of the regression analyses to be conducted include ROA and LEV as variables, and hence all observations missing either one or both of these values are deleted. The resulting number of observations is 48,517. Out of these 48,517 observations, the only variable with missing values is audit report lag. 2,940 observations are missing the audit report lag figures, which are needed for the second regression analysis, and thus for that analysis only the 45,577 observations that include the audit report lag figures will be used.

5.1.2 Descriptive Statistics

The descriptive statistics for the variables to be used in the first regression analysis are summarized in table 1. As the natural logarithms of audit fees and total assets are used in the regression model, the descriptive statistics of these values as well as the original values are presented in the table. The data consists of 48,517 observations.

Table 1 Descriptive Statistics of Audit Fee Model Variables

Variable	*N*	*Mean*	*Standard Deviation*	*Q1*	*Median*	*Q3*
ln(AF)	48 517	5.972	0.583	5.567	5.959	6.325
Audit Fee (MUSD)	48 517	2.625	6.764	0.369	0.911	2.113
ln(TA)	48 517	2.859	0.964	2.196	2.843	3.471
Total Assets (MUSD)	48 517	13 759.863	112 069.702	156.966	697.349	2 957.313
INV	48 517	0.082	0.124	0.000	0.021	0.123
ROA	48 517	– 0.013	2.174	– 0.019	0.021	0.066
LEV	48 517	0.557	0.509	0.327	0.536	0.754
BIG4 (dummy)	48 517	0.71	0.454	0	1	1
ICW (dummy)	48 517	0.06	0.229	0	0	0

In the data set for the first regression analysis the minimum audit fee is 7,000 USD and the maximum audit fee is 181.4 MUSD, while total assets are between 0.2 MUSD and 3,771,199.85 MUSD.

Next we will look at Pearson's product-moment correlations to enhance our understanding of the correlations between the independent variables in the audit fee model.

Table 2 Pearson's Product-Moment Correlations of Independent Variables in the Audit Fee Model

	ln(TA)	*INV*	*ROA*	*LEV*	*BIG4*	*ICW*
ln(TA)	1	– 0.120*	0.020*	0.157*	0.441*	– 0.094*
INV	– 0.120*	1	– 0.002	– 0.047*	– 0.026*	0.032*
ROA	0.020*	– 0.002	1	– 0.182*	0.027*	– 0.009
LEV	0.157*	– 0.047*	– 0.182*	1	– 0.010*	0.021*
BIG4	0.441*	– 0.026*	0.027*	– 0.010*	1	– 0.081*
ICW	– 0.094*	0.032*	– 0.009	0.021*	– 0.081*	1

Correlations marked with an asterisk are statistically significant at the 0.05 level. As can be seen from the table, the highest correlation between independent variables is the correlation between the natural logarithm of total assets and the Big 4 dummy

variable with a Pearson correlation coefficient of 0.441. All correlations between independent variables are fairly low and do not suggest problems arising from collinearity.

For the second regression analysis, only observations that include the figures for audit report lag are used. Even though some of the same variables are included in the first and the second regression analysis, the descriptive statistics of these variables differ in the two analyses as fewer observations are included in the data set used in the second regression analysis. The total number of observations that include values for all the variables used in the second regression analysis is 45,577. However, for this set of data, audit report lag is between 0 and 986 days. In order to eliminate outliers that would have a disproportionably large effect on the regression model, we will delete all observations with a reported audit report lag that is less than seven days or above 200 days. The descriptive statistics of the variables used in the second regression analysis are shown in table 3.

Table 3 Descriptive Statistics for Audit Report Lag Model Variables

Variable	*N*	*Mean*	*Standard Deviation*	*Q1*	*Median*	*Q3*
ln(ARL)	45 333	1.824	0.119	1.756	1.820	1.875
ARL (days)	45 333	69.41	21.585	57	66	75
ICW (dummy variable)	45 333	0.06	0.229	0	0	0
ln(TA)	45 333	2.870	0.958	2.210	2.856	3.477
Total Assets (MUSD)	45 333	13 614.510	111 627.967	162.307	717.772	2 999.206
ROA	45 333	– 0.003	2.234	– 0.015	0.022	0.067
LEV	45 333	0.555	0.457	0.329	0.537	0.752
LOSS (dummy variable)	45 333	0.30	0.457	0	0	1
ln(AF)	45 333	5.975	0.579	5.576	5.962	6.325
Audit Fee (MUSD)	45 333	2.591	6.581	0.377	0.916	2.112

Audit report lag for this data set is from seven days to 199 days. The minimum and maximum values of audit fees and total assets are the same as in the data set for the first regression analysis.

We will now look at Pearson's product-moment correlations to examine the correlations between independent variables in the audit report lag model.

Table 4 Pearson Product-Moment Correlations of Independent Variables in the Audit Report Lag Model

	ICW	*ln(TA)*	*ROA*	*LEV*	*LOSS*	*ln(AF)*
ICW	1	– 0.102*	– 0.010*	0.023*	0.109*	– 0.024*
ln(TA)	– 0.102*	1	0.011*	0.187*	– 0.355*	0.785*
ROA	– 0.010*	0.011*	1	– 0.177*	– 0.080*	0.006
LEV	0.023*	0.187*	– 0.177*	1	0.013*	0.091*
LOSS	0.109*	– 0.355*	– 0.080*	0.013*	1	– 0.188*
ln(AF)	– 0.024*	0.785*	0.006	0.091*	– 0.188*	1

In the table correlations that are statistically significant at the 0.05 level are marked with an asterisk. As seen from the table, the highest correlation is between the natural logarithm of total assets and the natural logarithm of audit fees, and the correlation coefficient is 0.785. This correlation coefficient is high in comparison to the other correlation coefficients, but does it not necessarily mean that the correlation will cause issues for the regression analysis. To determine whether the correlation causes multicollinearity problems, further statistical tests are needed.

5.2 Methods

5.2.1 Multivariate Regression Analysis

Regression analysis is a statistical method that can be used to investigate whether there is a causal relationship between two or more variables. It is one of the oldest multivariable methods that is still in use and also one of the most commonly used method for modelling reality, specifically the relationship between a dependent variable and an independent variable or variables. However, only the development of computing capacity of the past few decades has enabled broader use of multivariable methods such as multivariate regression analysis, which is the term for a regression analysis involving more than one independent variable. The basic premise for multivariate regression analysis is that there is a correlation between the dependent variable and independent variables, but the independent variables do not necessarily correlate with each other. In fact, correlation between independent variables

might distort the results of the analysis. (Yan 2009: 1; Metsämuuronen 2005: 581, 658-659)

The goal of multivariate regression analysis is to find a model for the relationship between the dependent variable and the independent variables. Regression analysis can be utilised to search for independent variables that best explain the changes in the dependent variable. It can also be used to examine the extent to which independent variables, known to be significant determinants of the dependent variable from previous research, have an effect on the dependent variable. For the purposes of this study, we use regression analysis for the latter objective. (Metsämuuronen 2005: 660-661)

The regression analysis usually follows a list of procedures. Firstly, and most importantly, it is necessary to carefully determine whether the hypothesis under investigation can be studied using regression analysis. Secondly, the regression model is defined, based on prior research. The generalised model for regression analysis is

$$y = f(x_1 + x_2 + \cdots + x_n) + \varepsilon,$$

where *y* is the dependent variable, and $x_1 + x_2 + \cdots + x_n$ are the independent variables, and ε is the random error, which can also be referred to as the residual. In this phase, the selection of appropriate variables is made. Thirdly, the data for the analysis is collected and processed so that it can be used in the analysis. Fourthly, the regression analysis is conducted – generally in the case of multivariate regression analysis this is done with the aid of statistical software. Fifthly, the selected model is carefully evaluated with various diagnosis methods to determine whether the model is sound and the assumptions of the regression analysis are met. (Metsämuuronen 2005: 659-660, 663; Yan 2009: 5)

The essential underlying assumptions of the regression analysis model are normality and homoscedasticity. The model depends on the premise that the residuals – the part of the model which the independent variables fail to account for – follow a normal distribution and that their dispersion is homoscedastic. Another assumption

of the regression analysis is that independent variables correlate with the independent variable to some extent, but do not strongly correlate with each other. If such strong correlation between independent variables were present, this would lead to a problem of collinearity. For example, two independent variables that strongly correlate with each other could be included in the same model, even though only one of these variables increases the coefficient of determination and inclusion of the other variable is redundant. (Metsämuuronen 2005: 659-660, 662; Yan 2009: 195-196)

5.2.2 Defining the Regression Models

5.2.2.1 Defining the Audit Fee Regression Model

A common methodology for studying the determinants of audit fees has developed and has been used in over 100 published journal articles. Typically, the model takes the following form:

$$ln(f_i) = b_0 + b_1 ln(A_i) + \sum b_k g_{ik} + \sum b_e g_{ie} + e_i,$$

where $ln(f_i)$ is the natural log of the audit fee, $ln(A_i)$ is the natural log of a size measure (usually total assets), and g_{ik} and g_{ie} are two groups of potential fee drivers. The model is based on Simunic's 1980 study, but the number of explanatory variables has substantially increased over the years. (Hay, Knechel, Wong 2006: 147)

In this study, we will use the following model to examine the relationship between a reported internal control weakness and audit fees:

$$ln(AF) = b_0 + b_1 \times ln(TA) + b_2 \times INV + b_3 \times ROA + b_4 \times LEV + b_5 \times BIG4 + b_6 \times ICW.$$

The variables are:

$ln(AF)$ = natural logarithm of audit fees

$ln(TA)$ = natural logarithm of total assets at year-end
INV = inventory as a proportion of total assets at year-end
ROA = return on assets (operating income/total assets)
LEV = leverage (total debt/total assets)
$BIG4$ = 1 if Big 4 auditor, else 0; and
ICW = 1 if an internal control weakness was reported, else 0.

These variables were chosen based on prior research and availability of data. Size is the most common determinant included in studies of audit fees, and in line with Simunic, size is measured by the natural logarithm of total assets. The natural logarithm of total assets is used to account for the non-linear relationship between audit fees and the size of an entity. The proxy for inherent risk is inventory as a portion of total assets. Profitability and leverage are measured by return on assets and debt as a portion of total assets, respectively. Two dummy variables were included to capture the effect of having a Big 4 auditor and reporting an internal control weakness on audit fees. A similar model was used in Raghunandan and Rama's 2006 study on the relationship between material weakness disclosures and audit fees. (Raghunandan and Rama 2006: 103)

Some variables were not included in the model due to the availability of data. Complexity is often measured by the number of subsidiaries, or the number of foreign subsidiaries, or the amount of foreign sales. Several studies have used the combination of receivables and inventory as a portion of total assets to proxy inherent risk, but due to the availability of data only inventory is used in this model.

Some determinants that were not included in Raghunandan and Rama's study were excluded from the model. The dummy variable for loss was not included in the model as it had mixed results in prior research (Hay et al 2006: 170-171). As all the data was from public companies, the entities included in the study had a similar form of ownership, and therefore there was no need to include a variable to measure the effect of the form of ownership on audit fees. Some more experimental determinants, such as free cash flow, location, fiscal year end date, and audit report lag were also left out of the model.

Based on previous research, presented in section 3, we hypothesize that the independent variables will have the following relationships with the dependent variable:

Table 5 Hypothesized Relationships between the Dependent Variable ln(AF) and the Independent Variables

Independent variable	*Relationship to dependent variable ln(AF)*
ln(TA)	+
INV	+
ROA	–
LEV	+
BIG4	+
ICW	+

5.2.2.2 Defining the Audit Report Lag Regression Model

Similarly to audit fee research, previous audit report lag research has used regression analysis as a way to find a model to describe the determinants of audit report lag. Many of the variables used by Munsif et al. are also included in our model. In order to increase the coefficient of determination of the model we will take the natural logarithm of audit report lag, total assets, and audit fees, as opposed to using the raw values. The model used to examine audit report lag is below.

$$ln(ARL) = b_0 + b_1 \times ICW + b_2 \times ln(TA) + b_3 \times ROA + b_4 \times LEV + b_5 \times LOSS + b_6 \times ln(AF)$$

The variables are:

$ln(ARL)$ = natural logarithm of the number of days between fiscal year-end and date of the audit report

ICW = 1 if an internal control weakness was reported, else 0

$ln(TA)$ = natural logarithm of total assets at year-end

ROA = return on assets (operating income/total assets)

LEW = leverage (total debt/total assets)

$LOSS$ = 1 loss, else 0; and

$ln(AF)$ = natural logarithm of audit fees.

Size is again measured by the natural logarithm of total assets, while profitability and leverage is measured by return on assets, debt as a portion of total assets, and a dummy variable for loss. Internal control is measured by a dummy variable for reported internal control weaknesses. The model also includes the natural logarithm of audit fees.

Based on previous research, we hypothesise that the independent variables will have the following relationships with the dependent variable:

Table 6 Hypothesized Relationships between the Dependent Variable ln(ARL) and the Independent Variables

Independent variable	*Relationship to dependent variable ln(ARL)*
ln(TA)	–
ICW	+
ROA	–
LEV	+
LOSS	+
ln(AF)	–

5.2.3 Limitations of the Models

As all empirical models, the model used suffers from an omitted variables problem, which means that all significant variables are not included in the model (Hay et al 2006: 179-180). Additionally, as with all multivariable analysis, in multivariate regression analysis choosing inessential variables will lead to uncertain or unstable results. (Metsämuuronen 2005: 661) The latter issue can be eliminated by carefully choosing the variables, which has been done in this study. However, only data from the AuditAnalytics and Compustat databases were used, which limited the selection of variables for the regression model. Both databases are limited to publicly available data.

6 Findings

6.1 Results of the Multivariate Regression Analyses

6.1.1 Audit Fee Model Results

In 5.2.2.1, the following model for examining the effect of a reported internal control weakness on audit fee was formulated:

$$ln(AF) = b_0 + b_1 \times ln(TA) + b_2 \times INV + b_3 \times ROA + b_4 \times LEV + b_5 \times BIG4 + b_6 \times ICW.$$

In this model, the natural logarithm of audit fees is the dependent variable while the natural logarithm of total assets, inventory as a proportion of total assets at year-end, ROA, leverage, Big 4 auditor, and internal control weakness are independent variables. Using SPSS, the regression model is run on the data (see 5.1.1 Data Selection) to determine the coefficients of the regression model.

The residuals show some heteroscedasticity (see section 6.2.1) and therefore the standard errors need to be corrected for heteroscedasticity. To account for this, we will need to correct the standard errors by using the method developed by White in 1980, which can be done with SPSS with a macro by Hayes and Cai from their 2007 research paper. (Hair et al 2014: 179-180; White 1980; Hayes and Cai 2007: 718) Running this macro produces heteroscedasticity-corrected values of standard errors, t-values, and p-values for the variables of the model. Table 7 shows the heteroscedasticity-consistent regression results:

Table 7 Multivariate Regression Results, Dependent Variable ln(AF)

	Coefficients	*Standard Error*	*t-value*	*p-value*
Constant	4.506	0.008	598.661	0.000
ln(TA)	0.411	0.003	141.481	0.000
ROA	– 0.004	0.003	– 1.326	0.185
LEV	– 0.026	0.019	– 1.391	0.164
INV	0.390	0.012	32.291	0.000
BIG4	0.371	0.004	86.137	0.000
ICW	0.184	0.007	26.260	0.000
R Squared	69.8 %			

As seen in table 7, the coefficients of the independent variables vary from – 0.026 to 0.411, with ROA and leverage having negative relationships with the dependent variable and the natural logarithm of total assets having the largest positive coefficient. The results of the t-test are shown in the as well, together with the calculated values for significance. The absolute t-values of ROA and LEV are below two and their p-values are above 0.05, and thus the variables are not statistically significant. All other variables are statistically significant, as their absolute t-values are larger than two and p-values are all 0.000 and thus smaller than 0.05. (Metsämuuronen 2005: 666)

Predictive accuracy of a regression model is most commonly measured by the coefficient of determination, denoted by R squared. The coefficient of determination is the squared correlation between the actual and predicted values of the dependent variable, and thus it represents the combined effects of all the independent variables and the intercept in predicting the dependent variable. The model has an R squared value of 69.8 %, which means that the model accounts for 69.8 percent of the variation of the dependent variable, the natural logarithm of audit fee. The R squared value increases as explanatory variables are added to the model, even if these variables are superfluous. One way to mediate this is to use the adjusted R squared value, which only increases if the change in the R squared value due to the addition of an independent variable is more than would occur by chance. The adjusted R squared value for the model is 69.8 %, equal to the R squared value. This indicates that the model does not contain superfluous independent variables. (Hair, Black, Babin, & Anderson 2014: 160-161, 171)

Placing the coefficients into the model gives us the following regression equation:

$$ln(AF) = 4.506 + 0.411 \times ln(TA) + 0.390 \times INV - 0.004 \times ROA + 0.026 \times LEV + 0.371 \times BIG4 + 0.184 \times ICW.$$

According to Halvorsen and Palmquist, the percentage effect of a continuous variable on the dependent variable equals to the coefficient of the continuous variable

multiplied by 100. In the model above, all but BIG4 and ICW are continuous variables. In order to interpret the effect that the dummy variables, BIG4 and ICW, have on audit fees, we use the following formula:

$$p = 100 \times (exp(c) - 1),$$

where p = percentage effect of the dummy variable and c = the coefficient of the dummy variable. By using this formula, we find that the percentage effect of BIG4 on audit fees is 44.9 % and the percentage effect of ICW on audit fees is 20.2 %.

Several continuous variables used in the audit fee model have extreme values. We will now conduct a sensitivity analysis to determine the effect that winsorizing continuous variables has on the results. The winsorizing will be conducted so that all values below the first percentile will be allocated the value of the first percentile and all values above the 99th percentile will be allocated the value of the 99th percentile. The regression analysis is then carried out using the winsorized continuous variables, and the standard errors are corrected for heteroscedasticity. The results of for the audit fee model are presented in table 8.

Table 8 Sensitivity Analysis, Dependent Variable ln(AF)

	Coefficients	*Standard Error*	*t-value*	*p-value*
Constant	4.466	0.005	845.072	0.000
ln(TA)	0.463	0.002	218.218	0.000
ROA	– 0.270	0.006	– 42.646	0.000
LEV	– 0.207	0.006	– 32.643	0.000
INV	0.466	0.012	39.326	0.000
BIG4	0.340	0.004	93.593	0.000
ICW	0.176	0.007	25.948	0.000
R Squared	71.0 %			

The sensitivity analysis of the audit fee model shows that using winsorized continuous variables increases the explanatory power of the model, as the coefficient of determination rises from 0.698 to 0.710. Coefficients of two variables, ROA and LEV, increase significantly, as in the original results they were close to zero and are now – 0.270 and – 0.207, respectively. All variables are statistically significant when winsorized values are used, while in the original analysis ROA and LEV were not

statistically significant. The coefficient of ICW decreases from 0.184 to 0.176, and accordingly the percentage effect of ICW is diminished from 20.2 % to 19.2 %.

6.1.2 Audit Report Lag Model Results

Another multivariate regression analysis was run to determine the relationship between internal control deficiencies and audit report lag. The dependent variable used was audit report lag, the independent variables were internal control weakness, the natural logarithm of total assets, ROA, leverage, loss and the natural logarithm of audit fees. As the residuals show heteroscedasticity (see section 6.2.2), and therefore the standard errors, t-values and p-values of the regression results need to be corrected for heteroscedasticity. The heteroscedasticity-consistent regression results are shown in the table below.

Table 9 Multivariate Regression Results, Dependent Variable ln(ARL)

	Coefficients	*Standard Error*	*t-value*	*p-value*
Constant	2.021	0.008	239.191	0.000
ICW	0.090	0.003	36.551	0.000
ln(TA)	– 0.019	0.001	– 15.212	0.000
ROA	– 0.001	0.000	– 4.691	0.010
LEV	0.006	0.003	1.730	0.084
LOSS	0.025	0.001	20.210	0.000
ln(AF)	– 0.026	0.002	– 15.301	0.000
R Squared	13.5 %			

Based on these results, it appears all variables apart from LEV are statistically significant, as their absolute t-values are above two and p-values below 0.05. LEV is not statistically significant, as its absolute t-value is below two and p-value above 0.05. All variables have coefficients that are quite small, with ICW having the largest coefficient of 0.090. Placing the coefficients into the model gives us the following regression equation:

$$ln(ARL) = 2.021 - 0.090 \times ICW - 0.019 \times ln(TA) - 0.001 \times ROA + 0.006 \times LEV + 0.025 \times LOSS - 0.026 \times ln(AF).$$

To interpret the effect of the dummy variables LOSS and ICW on audit report lag, we will again use the formula from Halvorsen and Palmquist. By substituting the coefficients of LOSS and ICW into the formula, we find that the percentage effect of LOSS on audit report lag is 2.5 % and the percentage effect of ICW on audit report lag is 9.4 %. The model has an R squared value of 13.5 %, which is equal to the adjusted R square value.

Similarly to the audit fee model, the audit report lag model also includes continuous variables that have extreme values, and a sensitivity analysis is also conducted for the audit report lag model. Winsorization of continuous variables is carried out in the same way as for the audit fee model variables. The multivariate regression is then conducted using the winsorized continuous variables. The results of this analysis are presented in table 10.

Table 10 Sensitivity Analysis, Dependent Variable ln(ARL)

	Coefficients	*Standard Error*	*t-value*	*p-value*
Constant	2.024	0.008	265.686	0.000
ICW	0.088	0.002	36.755	0.000
ln(TA)	– 0.022	0.001	– 18.705	0.000
ROA	– 0.005	0.003	– 1.772	0.076
LEV	0.018	0.002	8.265	0.000
LOSS	0.022	0.001	15.972	0.000
ln(AF)	– 0.026	0.002	– 16.556	0.000
R Squared	14.8 %			

The coefficient of determination is higher when the winsorized values for continuous variables are used, 14.8 % in comparison to the 13.5 % of the original analysis. There are some small changes in the coefficients, the largest change is for the coefficient of LEV, which increases from the 0.006 of the original analysis to 0.018. When using the winsorized values, all variables apart from ROA are statistically significant. The coefficient of ICW is smaller than in the original analysis, but the change is only 0.002. As a result, the percentage effect of ICW on audit report lag decreases from 9.4 % to 9.2 %.

6.2 Model Diagnostics

6.2.1 Audit Fee Model Diagnostics

After running the multivariate regression analysis on SPSS, we will now test the model used in the multivariate regression analysis for normality, homoscedasticity, and lack of multicollinearity. If our model does not meet these three assumptions, the results produced by it would not be reliable. The assumption of normality means that the residuals follow a normal distribution. This can be detected by plotting a Normal P-P Plot:

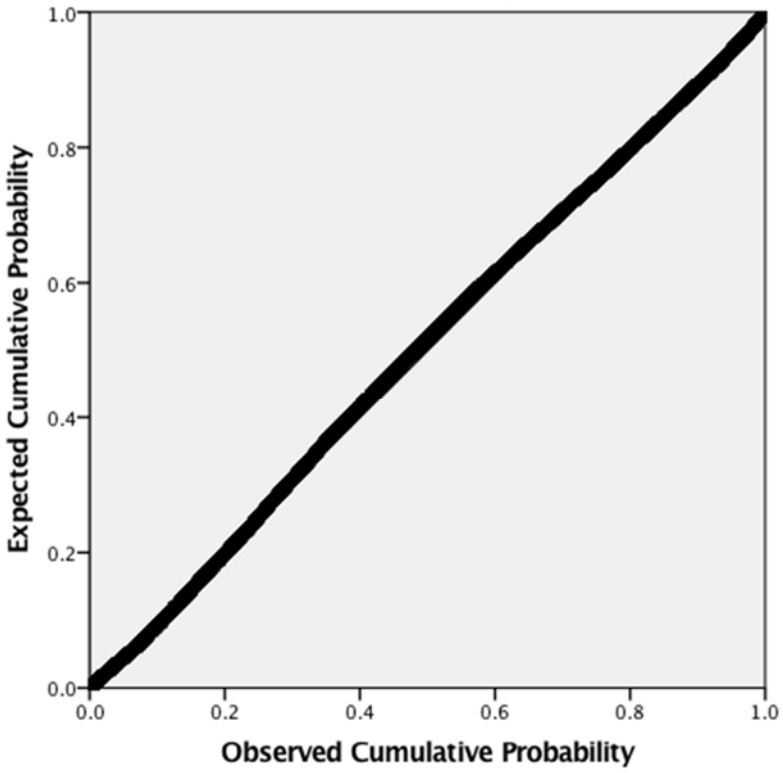

Figure 1 Normal P-P Plot of Regression Standardized Residuals, Dependent Variable ln(AF)

From this graph we can deduce that the residuals are normally distributed, as they fall very close to a straight line from the bottom left corner to the upper right corner. We can also plot a histogram showing the cumulative frequencies of residuals:

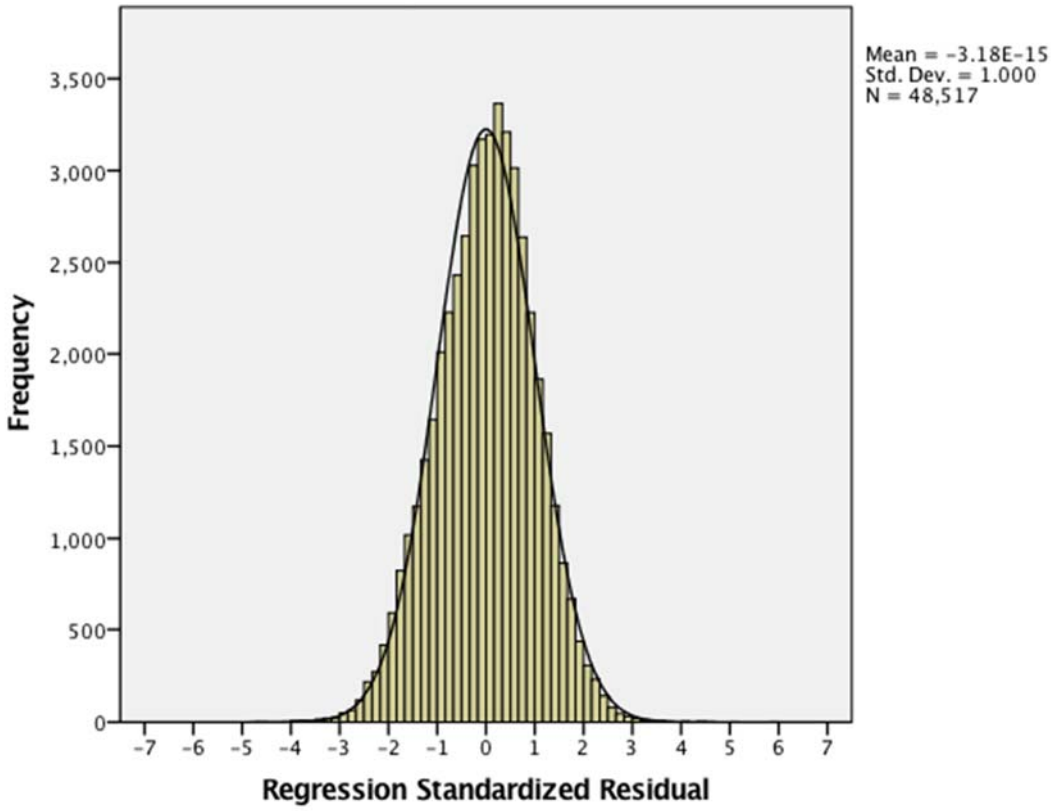

Figure 2 Histogram of Residuals, Dependent Variable ln(AF)

This histogram also shows that the residuals closely follow a normal distribution. We can thus conclude that our model meets the assumption of normality. (Metsämuuronen 2005: 685-686)

The assumption of homoscedasticity denotes that the residuals of the regression model should have a homoscedastic dispersion. This is best observed by plotting the studentized residuals against predicted values of the dependent variable. The resulting scatter plot including all the data points can be found in Appendix 1, but for clarity the axes have been adjusted to produce the following scatter plot.

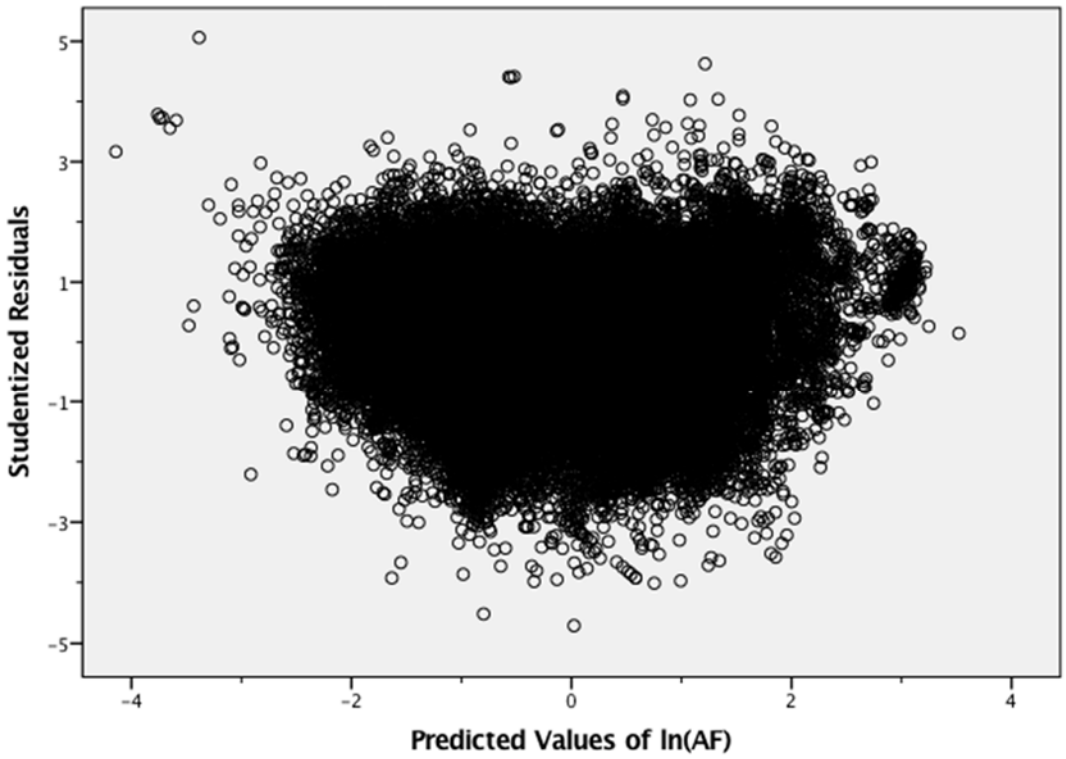

Figure 3 Scatterplot, Dependent Variable ln(AF)

As we can see, the residuals fall randomly, and their dispersion with regard to zero is relatively equal; there is no strong tendency for the residuals to be either less than or greater than zero. Similarly, there is no pattern for the large values of the predicted values of the dependent variable versus the small values. The scatter plot indicates that the dispersion of the residuals is rather homoscedastic, but there is some heteroscedasticity. This is why in 6.1.1 the standard errors were corrected by using a macro for SPSS from Hayes and Cai's research paper from 2007, and heteroscedasticity-consistent regression results were produced (Hayes and Cai 2007: 718).

Finally, we will test whether the regression model suffers from multicollinearity. There are several ways to test for multicollinearity, and we will begin by looking at the tolerance and VIF values calculated using SPSS presented in table 11.

Table 11 Tolerance and VIF Values, Dependent Variable ln(AF)

	Coefficients	*Tolerance*	*VIF*
Constant	4.506	–	–
ln(TA)	0.411	0.764	1.308
ROA	– 0.004	0.964	1.037
LEV	– 0.026	0.932	1.073
INV	0.390	0.984	1.017
BIG4	0.371	0.797	1.255
ICW	0.184	0.988	1.012

The last two columns of the table display the tolerance and VIF values for the variables. These two statistics can be used to evaluate whether there is multicollinearity. The tolerance value ranges from zero to one, with values close to zero suggesting that there might be multicollinearity. VIF, variance inflation factor, is the multiplicative inverse of tolerance, 1/tolerance, and a large VIF value would suggest multicollinearity. As both the tolerance values and the VIF values are relatively close to one, with the average tolerance value being 0.904 and the average VIF value being 1.117, the results of these statistics do not point to multicollinearity. Based on these two statistics, it appears that there is no multicollinearity. (Metsämuuronen 2005: 672, 682)

Another way to test for multicollinearity between the variables is to calculate the eigenvalues, condition indices, and variance proportions for the model using SPSS. The results are shown in the table below.

Table 12 Multicollinearity Diagnostics, Dependent Variable ln(AF)

Dimension	*Eigenvalue*	*Condition Index*	*Variance Proportions*						
			Constant	*ln(TA)*	*ROA*	*LEV*	*INV*	*BIG4*	*ICW*
1	3.780	1.000	0.01	0.00	0.00	0.02	0.02	0.01	0.01
2	1.022	1.923	0.00	0.00	0.90	0.01	0.00	0.00	0.00
3	0.942	2.003	0.00	0.00	0.00	0.00	0.00	0.00	0.95
4	0.680	2.358	0.00	0.00	0.01	0.04	0.87	0.01	0.01
5	0.383	3.140	0.00	0.01	0.08	0.74	0.02	0.15	0.01
6	0.147	5.072	0.17	0.08	0.01	0.19	0.03	0.76	0.01
7	0.046	9.018	0.82	0.90	0.00	0.00	0.05	0.07	0.01

If several eigenvalues of a model are equal or close to zero, this indicates strong correlation between the variables. In our model, the last dimension has an eigenvalue close to zero, which is common in a multivariate model, and does not in itself indicate multicollinearity. The condition indices in the next column also show no sign of multicollinearity, as all values are below 15. A condition index above 15 would imply problems with multicollinearity, and a condition index above 30 would suggest major problems with multicollinearity. If several variables had both high condition indices and variance proportions, multicollinearity would be a problem. Based on these statistical tests, our model does not suffer from multicollinearity. (Metsämuuronen 2005: 683)

Based on the model diagnostics we have conducted, our model meets the assumptions of the multivariate regression model; the residuals follow a normal distribution and are homoscedastic, and there is no multicollinearity.

6.2.2 Audit Report Lag Model Diagnostics

We will now carry out the same statistical tests for the audit report lag regression model. First, we will plot the production probability graph:

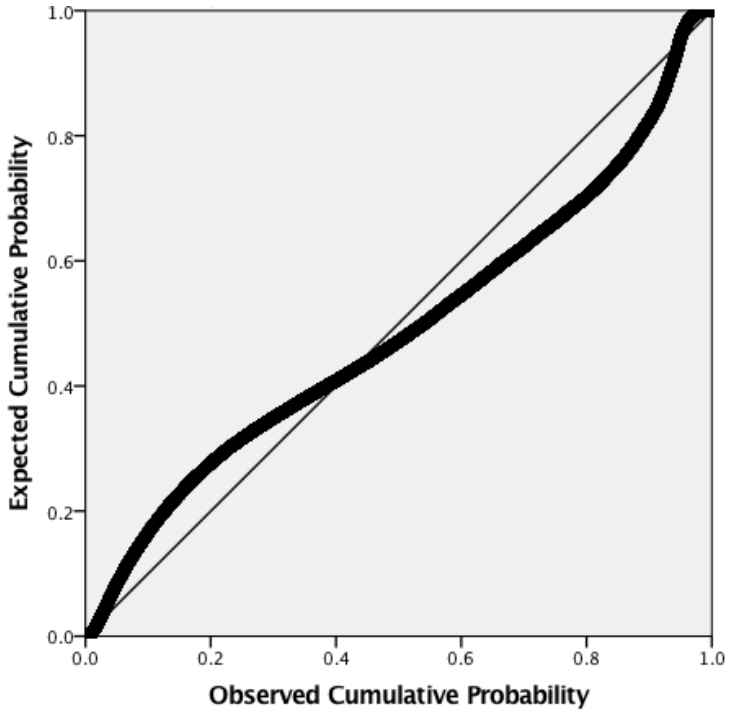

Figure 4 Normal P-P Plot of Regression Standardized Residual, Dependent Variable ln(ARL)

The thicker line shows the residuals, while the thinner line is a straight line drawn from the bottom left corner to the upper right corner. From comparing these two lines it's apparent that while the residuals do not follow a straight line exactly, though they fall relatively close to the line. This deviation from a normal distribution can be further observed in the histogram in Figure 5.

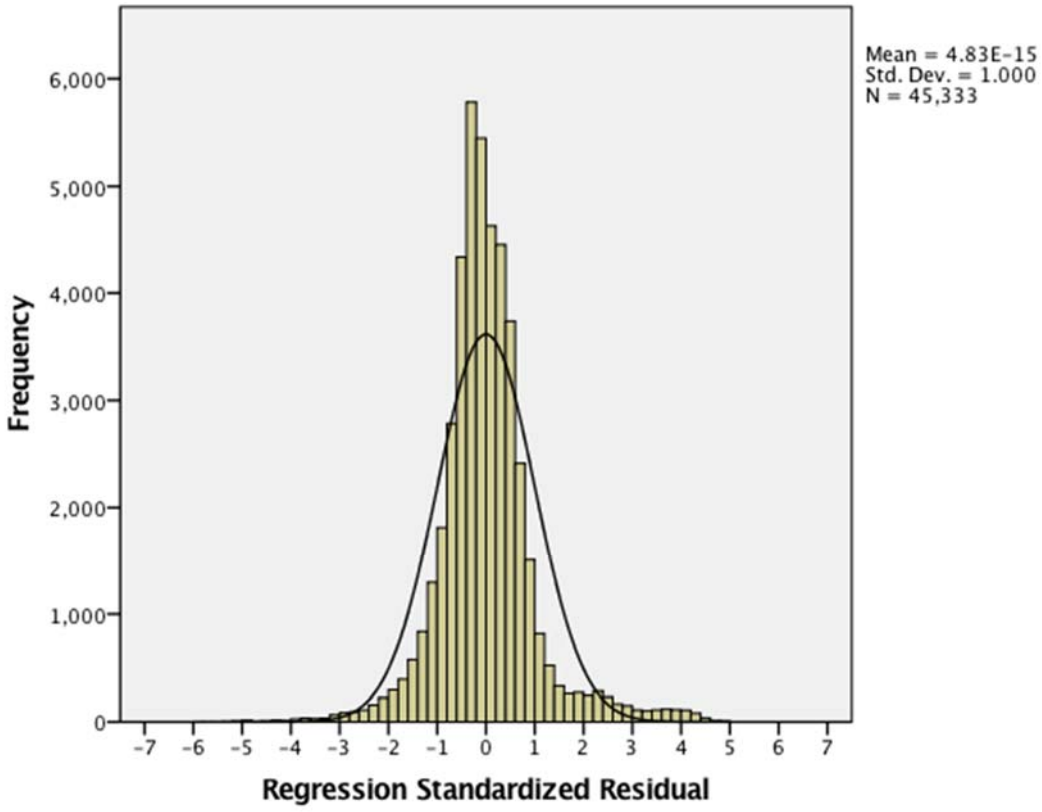

Figure 5 Histogram, Dependent Variable ln(ARL)

The histogram shows that the distribution is sharper than the normal distribution curve, and that there are more standardized residuals with a value over three than there are with a value below minus three. The assumption of residuals with a normal distribution is violated, but the violation is not extensive.

Next we will plot studentisized residuals against their predicted values to test the assumption of homoscedasticity of the residuals.

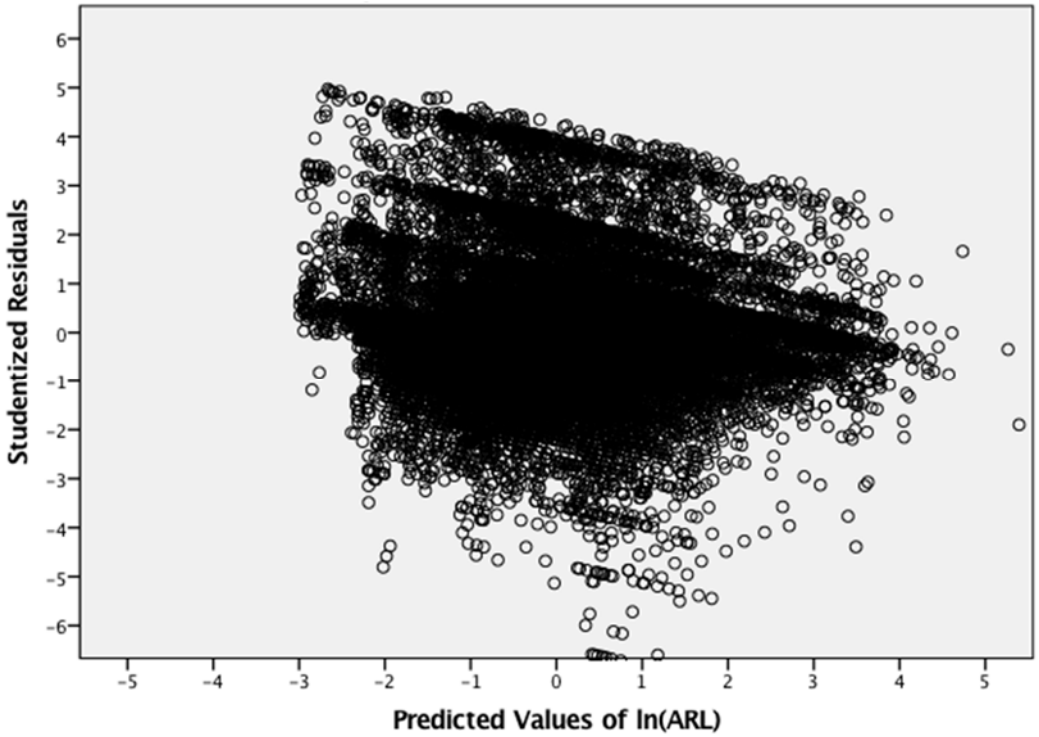

Figure 6 Scatterplot, Dependent Variable ln(ARL)

As seen from the scatter plot above, there is some heteroscedasticity, and as with the audit fee model, the standard errors need to be corrected to be heteroscedasticity-consistent. The heteroscedasticity-consistent results were be presented in 6.1.2.

Lastly, we will test the independent variables of the regression model for multicollinearity. To do this, we will look at the eigenvalues, condition indices, and variance proportions of the model, which are shown in the table below.

Table 13 Multicollinearity Diagnostics, Dependent Variable ln(ARL)

Dimension	*Eigenvalue*	*Condition Index*	*Variance Proportions*						
			Constant	*ln(TA)*	*ROA*	*LOSS*	*LEV*	*ICW*	*ln(AF)*
1	4.017	1.000	0.00	0.00	0.00	0.01	0.02	0.01	0.01
2	1.021	1.984	0.00	0.00	0.89	0.01	0.00	0.01	0.00
3	0.946	2.061	0.00	0.00	0.03	0.02	0.01	0.86	0.95
4	0.667	2.454	0.00	0.00	0.02	0.73	0.02	0.10	0.01
5	0.302	3.645	0.00	0.01	0.07	0.00	0.94	0.00	0.01
6	0.044	9.506	0.04	0.43	0.00	0.20	0.01	0.01	0.01
7	0.002	43.932	0.96	0.56	0.00	0.01	0.02	0.01	0.01

As noted in section 6.2.1, several eigenvalues close to zero would indicate a strong correlation between the variables. As seen in table 13, only the last dimension has an eigenvalue that is close to zero, and therefore the eigenvalues do not indicate multicollinearity. The condition index for the last dimension is quite high, and by itself would suggest that the model has problems with multicollinearity. However, the variance proportions remain low, so there is no combination of a high condition index and high variance proportions, which would point to multicollinearity. (Metsämuuronen 2005: 683)

Next, we will calculate the tolerance and VIF values to further examine whether the model suffers from multicollinearity. The results from SPSS are presented in table 14.

Table 14 Tolerance and VIF Values, Dependent Variable ln(ARL)

	Coefficients	*Tolerance*	*VIF*
Constant	2.021	-	-
ln(TA)	-0.019	0.320	3.127
ROA	-0.001	0.962	1.039
LOSS	0.025	0.837	1.195
LEV	0.006	0.915	1.092
ICW	0.090	0.975	1.025
ln(AF)	-0.026	0.367	2.723

Tolerance values close to zero would point to multicollinearity, and the lowest value found in the table above is 0.320 for ln(TA), and the second lowest tolerance value is 0.367 for ln(AF). All the other tolerance values are close to one. None of these values are so close to zero that they would indicate multicollinearity. The VIF values are all relatively low, with ln(TA) having the highest VIF value at 3.127 and ln(AF) having the second highest VIF value at 2.723. As with the tolerance values, the VIF values also do not suggest that the model has problems with multicollinearity. There is a positive relationship between ln(TA) and ln(AF), but this does not lead to multicollinearity for this regression model. Based on the tolerance and VIF values together with the values presented in table 14, we conclude that multicollinearity is not an issue for the audit report lag regression model. (Metsämuuronen 2005: 682)

7 Discussion

7.1 Relationship between Internal Control Deficiencies and Audit Fees

The audit fee model has a coefficient of determination of 0.698, which suggests that the model developed accounts for well over half of the variation in audit fees. The majority of the important determinants of audit fees seem to be included in the model. As stated in 5.2.2.1, some determinants of audit fees found to be significant in prior research were not included in the model due to lack of data. Including variables such as receivables as a portion of total assets and the number of subsidiaries could further increase the explanatory power of the model. A dummy variable to account for the effect of the fiscal year end date coinciding with the busy season of the auditors could also be added, and the addition could potentially increase the explanatory power of the model.

The following table shows the expected signs of the coefficients and the actual signs of the coefficients:

Table 15 Hypothesized and Actual Signs of the Coefficients, Dependent Variable ln(AF)

Independent variable	*Hypothesized sign*	*Actual sign*
ln(TA)	+	+
INV	+	+
ROA	–	–
LEV	+	–
BIG4	+	+
ICW	+	+

The signs of the coefficients of all but one variable correspond to the hypothesized signs and are in line with previous research results. LEV, debt as a portion of assets, is the only variable showing an opposite sign. However, as concluded in 6.1.1, ROA and LEV are not statistically significant in the heteroscedasticity-consistent results. It is not surprising that ROA is not a statistically significant variable, as auditors do not necessarily base their pricing on just the profitability. A low ROA in one year might not be a cause for concern if it is preceded by several years of higher returns,

and conversely a company that has seen low profitability for several years but suddenly has a profitable fiscal year will likely be seen as a riskier audit client. Changes in ROA might also not reflect the profitability of the company, as for example selling fixed assets would increase ROA, but not affect the company's profitability overall. ROA can also vary depending on the industry, as asset-heavy industries will likely see lower ROA on average in comparison to industries that are less capital-intensive. The audit fees might therefore not be very responsive to changes in ROA. The amount of debt as a portion of total assets might also not accurately capture the risk of loss exposure for the auditor, and consequently the indebtedness of the entity may not have such a direct effect on audit fees.

In the sensitivity analysis carried out in 6.1.1, we found that winsorizing the continuous variables prior to performing the regression analysis led to all variables being statistically significant. These regression results also showed a significant negative relationship between leverage and audit fees, that is, the higher the ratio of debt to total assets is, the lower the audit fees are. It could be that entities with debt need to monitor their financial situation more strenuously to make sure that they make their debt payments, and as a consequence have more evolved financial reporting, which makes the auditing more straight-forward. As pointed out in 3.7, regular debt payments decrease the amount of free cash flow, which has a positive relationship with audit fees, which could insinuate that higher debt payments would have a negative relationship with audit fees. However, as this result is contrary to what has been found in prior research, further research is required to make any conclusions on this.

The hypothesis formulated in 1.2 was that audit fees would be higher for companies that have reported at least one internal control deficiency, and as we found that companies that reported at least one internal control deficiency had higher audit fees by 20.2 percent in comparison to companies reporting no internal control deficiencies, the results support the hypothesis. Raghunandan and Rama's study found a higher percentage of 43 percent, but the conclusion of a positive relationship between internal weakness disclosures and audit fees was the same. The result is therefore in line with prior research. The lower percentage could be due to the differing time period, as Raghunandan and Rama were investigating the effect in the

first years when SOX Section 404 required internal control material weakness disclosures. It could be that once both auditees and auditors became more familiar with the requirements of Section 404, the amount of additional audit work relating to internal control deficiencies decreased and thus the impact of a material weakness disclosure lessened to some extent.

7.2 Relationship between Internal Control Deficiencies and Audit Report Lag

The coefficient of determination of the audit report lag model is 0.135, which is quite low, suggesting that some determinants of audit report lag were not included in the model. Explanatory power of audit report lag models in previous research has generally varied between 20 – 40 percent, in comparison to which the explanatory model formulated in this thesis is somewhat lower. Based on prior research, such determinants could be the auditee's complexity, measured by for example the number of business segments or primary industry, the use of a Big 4 auditor, provision of non-audit services by the auditor, auditor tenure, and audit opinion.

In this thesis, audit report lag was used as a measure for the duration of the audit, as audit report lag data is readily available. However, several of the determinants found for audit report lag were more associated with the amount of audit work. Furthermore, as the amount of interim audit work has increased, audit report lag becomes a more inaccurate measure of the overall duration of an audit. If the increase in the amount of audit work comes mainly in the form of increased interim audit work, the association between the amount of audit work and audit report lag becomes weaker, and therefore determinants of the amount of audit work would account for less of the variation in audit report lags.

The following table summarises the predicted and actual signs of the coefficients of the audit report lag model:

Table 16 Hypothesized and Actual Signs of Coefficients, Dependent Variable ln(ARL)

Independent variable	*Hypothesized sign*	*Actual sign*
ln(TA)	–	–
ICW	+	+
ROA	–	–
LEV	+	+
LOSS	+	+
ln(AF)	–	–

As seen from the table, all coefficients have the hypothesized signs and thus the signs of the coefficients are in line with previous research. LEV was found to not be statistically significant, suggesting that a high amount of debt as a portion of total assets does not significantly increase the audit report lag. LOSS, however, was found to be statistically significant, and therefore it seems that a loss would increase the amount of audit work more than the leverage figure. All variables had relatively low coefficients, which means that they do not have a very strong effect on audit report lag. As discussed with the audit fee model, ROA does not capture changes in profitability perfectly, and the fluctuation in ROA might not greatly affect the auditor's loss exposure and therefore audit fees. It follows that ROA would not have a major effect on the amount of audit work, and via that, audit report lag. The size of the auditee has a negative relationship with audit report lag, hypothesized to be caused by the ability of a larger auditee to speed up the audit process. A larger auditee can often also be more complex to audit, which could somewhat lessen the negative affect that size has on audit report lag. Audit fees, unlike audit report lag, are affected by interim audit work, which could be one of the factors behind the fairly low coefficient. A longer audit report lag might also be caused by something that does not increase the amount of audit work, for example the auditee might be late in delivering some material required to complete the audit. If the amount of audit work is not increased, the audit fee is likely not affected.

The hypothesis formulated in 1.2 stated that the audit report lag would be longer for entities that reported at least one internal control deficiency, and the results confirm the hypothesis. The percentage effect of at least one reported internal control material weakness on audit report lag is 9.4 %. The positive relationship between audit report lag and internal control deficiencies is in line with previous research.

8 Conclusions

The aim of the thesis was to investigate the relationship between a reported material weakness in internal control and audit fees and audit report lag. Based on prior research, the hypotheses were that a reported material weakness would increase audit fees and prolong the audit report lag, and both sets of the results of the regression analyses supported these hypotheses. Some of the variables included in the models were not found to be statistically significant, but the effect of the dummy variable for internal control deficiencies was significant in both models. The percentage effect of the internal control deficiency variable was somewhat lower than in previous research, but the relationship between the dependent variables, audit fees and audit report lag, and the internal control deficiency variable was positive, which is in line with previous research. The coefficients of determination for the regression models were also lower than those in prior studies, which is likely due to the fewer number of variables included in the models. Increasing the number of significant variables included in the models would improve the coefficients of determination, and could also affect the percentage effect of the internal control deficiency variable. This study was limited to public data from Compustat and AuditAnalytics databases, which made the inclusion of some variables impossible.

This thesis has expanded the body of knowledge regarding the effect of an internal control deficiency on the price and length of the audit. However, as discussed earlier, audit report lag is not a perfect measurement for the duration of the audit, but it is the only publicly available measurement for the length of an audit. Data on the length of the audit measured in a different way, for example the hours of work put in by the auditors, or the duration of the audit fieldwork, could be used as a dependent variable and could lead to a model that more accurately describes the relationship between the length of audit and its determinants. Base on the results from this thesis, it seems that the variables used in the audit report lag model are either do not have strong relationships with the amount of audit work, or that the audit report lag is not extremely responsive to changes in the amount of audit work. The amount of audit work could have a stronger correlation to the amount of time between when the audit field work is initiated and the audit field work is concluded, for example. Different kinds of audit report lags could be used to establish a better measurement

for the amount of audit work completed, but this would require access to auditors' records.

In this thesis it was concluded that internal control deficiencies increase audit fees and prolong the audit report lag. For entities purchasing audit services, it is useful to know that having material weaknesses in internal control could lead to longer and costlier audits. The research result could be generalised to be that the state of internal control influences audit fees and audit report lags, and that entities wishing to lower their audit fees and shorten their audit report lags could consider improving the state of internal control. However, improving internal control requires resources and knowhow, which some entities may be reluctant to employ. Improving internal control may also be costly, and on the whole, it may be more cost-effective to pay higher audit fees than improve internal controls. More information on the relationship between internal control and audit fees, as well as internal control and audit report lag, can make the choice of resource allocation between internal control and auditing a more informed choice.

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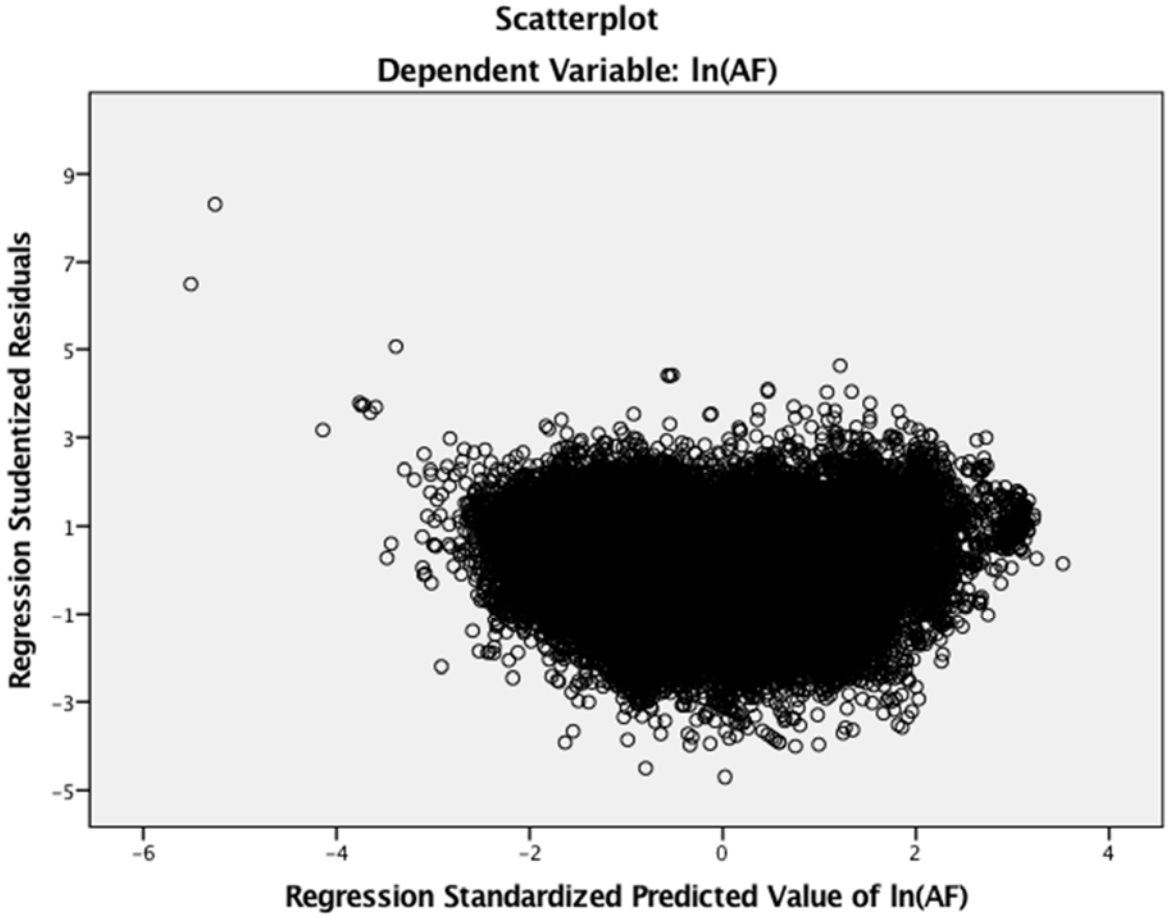
Appendices

Appendix 1: Scatterplot of the Residuals of the Audit Fee Model



Appendix 2: Scatterplot of the Residuals of the Audit Report Lag Model